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Spatial Heterogeneity and association between the survey-based Women's Empowerment Index (SWPER) and unmet need for birth spacing in sub-Saharan Africa

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Abstract

Background Unmet need for birth spacing can significantly impact maternal and child health outcomes, leading to unintended or mistimed births, neonatal mortality, pregnancy loss, induced abortions, small-sized births, and malnutrition. Considering the role of women empowerment in women's sexual and reproductive health, we examined the association between the survey-based women's empowerment index (SWPER) and unmet need for spacing in sub-Saharan Africa (SSA).

Methods We used data from the Demographic and Health Surveys of 21 in SSA conducted between 2015 and 2021. In this study, the unit of analysis was women of reproductive age (15 to 49 years) who were married or living together and required family planning during the survey period. Multilevel logistic regression was fitted to examine the association between SWPER and the unmet need for spacing. The results were presented using adjusted odds ratios (AORs) with 95% confidence intervals (CIs).

Results The hotspot countries for unmet need for birth spacing were Angola, Benin, Liberia, Mauritania, and Sierra Leone. The findings showed that with the empowerment indicators, women with high attitude to violence (disagreement or rejection of violence) (AOR = 0.95; 95% CI 0.91, 0.99), and women with high decision-making (AOR = 0.90; 95% CI 0.85, 0.95) exhibited lower odds of unmet spacing need relative to women with low attitude to violence and those with low decision making. Women with high autonomy (AOR = 1.32; 95% CI 1.25, 1.39) were more likely to experience unmet need for spacing compared to those with low autonomy.

Conclusion Unmet need for spacing has been linked to indices of women's empowerment such as attitudes toward violence, independence, and decision-making. Organizations such as UNICEF, UNFPA, and the Bill & Melinda Gates Foundation should consider incorporating SWPER indicators when planning interventions to address the high unmet need for spacing among women in SSA. Additionally, various governments and aid organizations must give women's empowerment a high priority as a tactical intervention strategy to increase access to contraception in the countries considered in this study. These programmes would contribute to attaining SDGs 3.1 and 3.7.

Keywords Survey-based women's empowerment index, Contraception, Unmet need, Birth spacing, Maternal health, Global health, Sub-Saharan Africa

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Background

Sexual and reproductive health problems are a significant contributor to poor health and mortality among women and girls of reproductive age, particularly in low- and middle-income countries (LMICs) [1]. Improving maternal health and well-being remain at the top of the global health agenda. Target 3.1 of the Sustainable Development Goal (SDG) aims to reduce maternal mortality rates below 70 deaths per 100,000 live births globally, while SDG 3.7 calls for achieving universal access to sexual and reproductive healthcare services, including family planning, information and education, and the integration of reproductive health into national strategies and programmes by 2030 [2]. Family planning is not only crucial to directly promote maternal and child health, but also contributes to women's empowerment, economic growth, poverty reduction, and environmental sustainability [3]. Expanding access to family planning services could lead to a reduction of maternal mortality by enabling women to delay motherhood, space births, prevent unintended pregnancies, avoid the need for abortions and stop childbearing once they have achieved their desired family size [4]. In 2022, the use of contraception prevented over 141 million unintended pregnancies, around 29 million unsafe abortions, and nearly 150,000 maternal deaths [5].

High rates of unintended pregnancies are linked to an unmet need for family planning, a valuable measure of the gap between women's reproductive intentions and their contraceptive behaviours [6, 7]. Unmet need for family planning refers to the population of currently married or in-union and fecund women who are not using any contraceptive method but desire to either delay (unmet need for spacing) or terminate their subsequent pregnancy (unmet need for limiting) [8]. As of 2019, an estimated 163 million women had an unmet need for contraception, of which 29.3% resided in SSA and 27.2% resided in South Asia [9]. A multi-country study has found that the prevalence of unmet need for spacing in SSA was higher at 15.81% compared to the prevalence of unmet need for limiting, which was 7.90% [10].

Unmet need for spacing refers to the percentage of sexually active and fecund women who wish to delay their next births for at least two years or more, but not using any contraceptive method [11]. Research has shown that unmet need for spacing can significantly impact maternal and child health outcomes, leading to unintended or mistimed births, neonatal mortality, pregnancy loss, induced abortions, small-size births, and malnutrition [12]. Women with shorter inter-pregnancy intervals (less than two years) are at a higher risk of maternal death (2.5 times), third-trimester bleeding (1.7 times), anemia (1.3 times), low birth weight (40% higher), and pre-term birth (40% higher) than those with longer inter-pregnancy intervals [13].

Meeting the contraceptive needs of women involves a multifaceted interplay of factors constituting a woman's set of choices and challenges throughout her reproductive years. Several factors such as social, cultural, economic, and individual characteristics are associated with unmet need for spacing [10, 14, 15]. Notably, women encountering financial, educational, geographical, or social barriers tend to experience consistently high levels of unmet needs [10, 16]. The persistent dominance of patriarchal norms and traditional gender roles leading to the disempowerment and low status of women, further hinders women's ability to access and utilize reproductive health services [17].

A woman's decision regarding the utilization of family planning services is influenced by the interactions, relationships, and circumstances within her household, all of which can impact her level of autonomy [18, 19]. Indicators of women's empowerment (e.g. the number of decisions a woman makes independently or jointly with her spouse) along with the availability of healthcare-related resources through employment have a significant effect on the utilization of family planning services, including unmet needs [20, 21].

Women's empowerment is a complex, multidimensional concept that varies across cultures and encompasses women's social status, position and capacity to make decisions and choices in life [22, 23]. The assessment of women's empowerment differs among different research studies, and there is limited consensus on the dimensions and levels that hold greater significance [24–26]. In 2017, a survey-based women's empowerment index (SWPER) was introduced and validated using DHS data from 34 African countries. SWPER encompasses three well-recognised domains of women's empowerment: attitude towards violence, social independence, and decision-making [27]. Given the significant role of gender equality and the empowerment of women in promoting social progress, economic growth, and sustainable development, SDG 5 underscores the global commitment to addressing these issues. There is a substantial body of literature that explores the association between women's empowerment and contraceptive usage [28–31]. However, to the best of our knowledge, evidence on the relationship between women's empowerment and unmet need for spacing is limited. The purpose of this study is to examine the spatial heterogeneity and association between women's empowerment and unmet need for spacing in SSA, using the newly developed SWPER index, to identify effective strategies for improving family planning programs in the sub-Saharan African region.

Methods

Data source and population

This research used the most recent data from the DHS of 21 countries in SSA conducted between 2015–2021. These include Angola, Benin, Burundi, Cameroon, Ethiopia, Gambia, Guinea, Liberia, Madagascar, Mali, Mauritania, Malawi, Nigeria, Rwanda, Sierra Leone, Senegal, Tanzania, Uganda, South Africa, Zambia and Zimbabwe. In this study, the unit of analysis was women of reproductive age (15 to 49 years) who were married/lived together and required family planning during the survey period. Sexually inactive, infecund and sterilized women were excluded from the study population. With a total sample of 165,188, Table 1 describes the sample for the various countries considered. Access to the data can be requested via https://www.measuredhs.com.

Variables and measurements

Dependent variable

Having an unmet need for spacing, that is, if a woman wanted current pregnancy/last birth later was the outcome variable of interest. This variable was coded in a binary form with women who had an unmet need for spacing recorded as 1 and 0 if otherwise.

Table 1 Description of the study sample by countries

Country	Sample	Percentage
Angola 2015–16	6,639	4.02
Benin 2017–18	7,924	4.8
Burundi 2016–17	9,734	5.89
Cameroon 2018	7,486	4.53
Ethiopia 2016	8,796	5.33
Gambia 2019–20	5,128	3.1
Guinea 2018	4,949	3
Liberia 2019–20	3,509	2.12
Madagascar 2021	10,043	6.08
Mali 2018	5,367	3.25
Mauritania 2019–21	6,017	3.64
Malawi 2015–16	14,035	8.5
Nigeria 2018	21,050	12.74
Rwanda 2019–20	8,405	5.09
Sierra Leone 2019	7,102	4.3
Senegal 2019	4,044	2.45
Tanzania 2015–16	7,380	4.47
Uganda 2016	9,920	6.01
South Africa 2016	4,495	2.72
Zambia 2015	7,349	4.45
Zimbabwe 2015	5,816	3.52
Total	165,188	100

Independent variables

The SWPER index comprising three indicators was the main independent variable. The indicators were attitude towards violence, women's autonomy, and women's decision-making capacity. Attitude towards violence consisted of five questions that examined whether beating the wife for doing things like going out without notifying the husband, neglecting the kids, fighting with the husband, refusing to have sex with him, and setting food on fire was acceptable. Those who had low attitudes to violence meant they supported violence based on their responses to the questions and so had a negative attitude towards violence. The high attitude denotes strong disagreement or rejection of violence (positive attitude towards violence). Responses to inquiries on reading newspapers or magazines frequently, employment during the previous year, a woman's education, the educational gap between a husband and wife, the respondent's age during cohabitation, and the respondent's age at their most recent first birth all fell under the category of autonomy. Decision-making factors included replies to questions on who typically makes decisions about respondents' health care, significant household purchases, and visits to family or relatives. Table 2 contains the recode of these variables. These were utilized to create scores using a Principal Component Analysis (PCA) for attitudes toward violence, autonomy, and decision-making. The methodology for generating the scores has been described in more detail in previous studies [32, 33]. A score of zero implies parity with the average for Africa because the scores are standardized. Positive results indicate better conditions than the average for Africa, and vice versa.

Covariates

Age, total number of children ever born, wealth, religion, and place of residence were included in the analyses as covariates. Total children ever born was recoded as no child, 1–2, 3–4 and 5+. Religion was also recategorized as Christian, non-Christian and no religion. We captured the countries under Southern Africa, Western Africa, Eastern Africa, and Central Africa sub-regions.

Data analysis

Prior to conducting any analysis, the data were weighted using sample weight in order to take the sampling design into consideration. The recoding, coding and analyses were all done with STATA. We looked at descriptive statistics utilizing frequencies and percentages and presented the findings within a spatial map and table. Multilevel logistic regression was fitted to examine the association between SWPER and the unmet need for spacing in SSA. In total, four models were created.

Table 2 Variables included in the Women Empowerment Index (SWPER) for Ghana

Variable	Category	Code
Attitude to violence		
Beating justified if wife goes out without telling husband	Yes = -1; Don't Know = 0; No = 1	High (score > 0.400) Medium (score > -0.700 ≤ 0.400) Low (score ≤ -0.700)
if wife neglects the children		
if wife argues with husband		
if wife refuses to have sex with husband		
if wife burns the food		
Autonomy		
Frequency of reading newspapers or magazine	Not at all = 0; < once a week = 1; ≥ once a week = 2	High (score > 0.293) Medium (score > -0.559 ≤ 0.293) Low (score ≤ -0,559)
Respondent worked in last 12 months	No = 0; In the past year = 1; Have a job, but on leave last 7 days = 2; Currently working = 2	
Woman education – years of schooling	Years	
Education difference: woman—husband years of Schooling	Years	
Age difference: woman—husband	Years	
Age at first cohabitation	Years	
Age of respondent at 1st birth	Years	
Decision making		
Who usually decides on respondent's health care	Husband/other alone = -1; joint = 0; respondent alone = 1	High (score > 0.600) Medium (score > -1.000 ≤ 0.600) Low (score ≤ -1.000)
Who usually decides on large household purchases		
Who usually decides on visits to family or relatives		

The model with only the dependent variable and no explanatory variable was model 0. The model with the dependent variable and SWPER factors (Attitude to Violence, Autonomy, and Decision Making) (model 1), the model with the dependent, SWPER and individual level variables (Age, Total Number of Children Ever Born, and Religion) (model 2), the model with the dependent variable, SWPER, and contextual factors (Wealth, Residence, Sub-Region) (model 3), and the model with the dependent variable and all factors (model 4). A $p < 0.05$ was considered statistically significant.

Results

Figure 1 shows the spatial distribution of the prevalence of unmet need for spacing among women in the 21 countries in SSA. The hotspot countries for unmet need for spacing were Angola, Benin, Liberia, Mauritania, and Sierra Leone. Overall, 16.6% of the women had an unmet need for spacing (Table 3).

Table 3 displays the frequencies, the proportion of unmet need, and bivariate analysis of variables connected with unmet need for spacing. The unmet spacing need was revealed to be higher (21.9%) among women aged 15–19. Women with 2-children had increased percentage of unmet need for spacing (18.9%). In terms of wealth, women in the poorest wealth category (18.2%) showed the greatest proportion of unmet spacing need relative to women in the richest wealth category (13.8%). Unmet spacing need was great among women with no religion (33.9%) compared to Christian women (16.3%).

Regarding the empowerment indicators, women with low attitude to violence (17.7%) showed greater unmet spacing need. Unmet need for spacing was high among women demonstrating medium levels of autonomy (17.8%) compared to those with high autonomy (14.6%). Women with low decision making (20%) had the highest unmet need for spacing relative to those with high decision making (14.2%). With sub-region, women staying in Central Africa showed the highest unmet need for spacing (23.5%). All the explanatory variables and the empowerment indicators showed statistically substantial connection with unmet spacing need at $p < 0.05$, apart from place of residence (see Table 3).

Model 4 of Table 4 provides a summary of the multilevel models of independent variables associated with unmet need for spacing. The findings showed that with the empowerment indicators, women with high attitude to violence (AOR = 0.95; 95% CI 0.91, 0.99), and women with high decision making (AOR = 0.90; 95% CI 0.85, 0.95) exhibited lower odds of unmet spacing need relative to women with low attitude to violence and those with low decision making. Compared to women with low autonomy, those with high autonomy (AOR = 1.32;

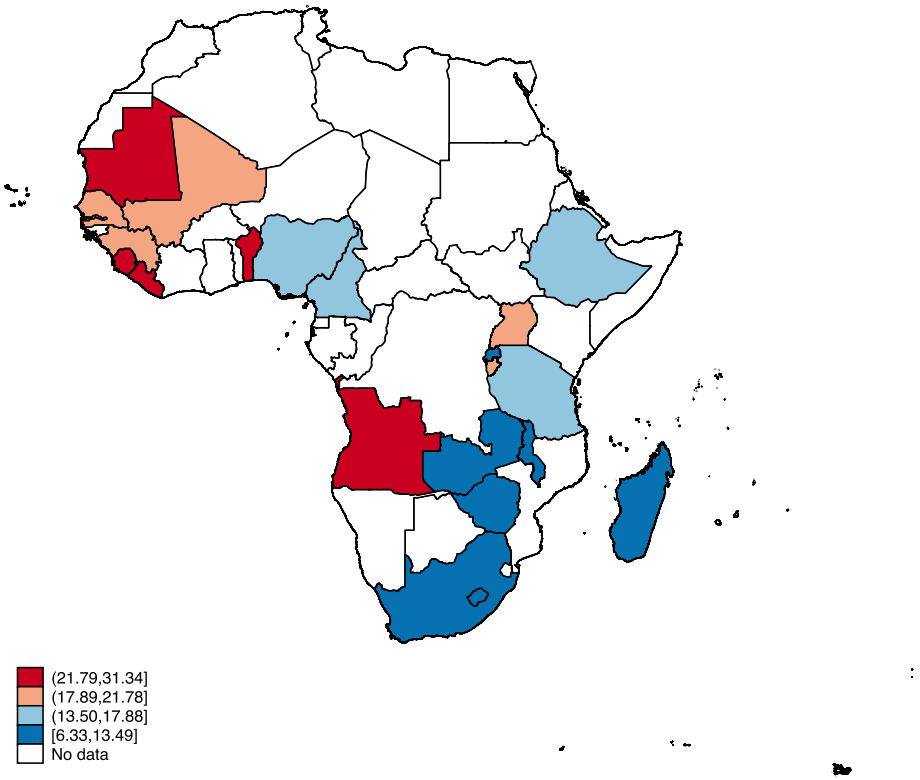

Fig. 1 Proportion of women with unmet need for spacing in sub-Saharan Africa

95% CI 1.25, 1.39) showed higher likelihood of unmet need for spacing.

Discussion

In this study, we examined the spatial heterogeneity and correlation between women's empowerment and unmet need for spacing among SSA women. It was found that in the selected SSA countries, 16.6% of women indicated having unmet spacing needs, with Angola recording the maximum prevalence at 31.34% and Zimbabwe having the least frequency at 6.33%. Our analysis also revealed a statistically significant relationship between women's empowerment status (attitude towards violence, autonomy, and decision-making), age, parity, religion, affluence, residency, and sub-region in healthcare and unmet need for spacing. This study's findings on the prevalence of unmet spacing needs are consistent with prior studies in SSA [10, 34, 35]. The prevalence seen in Angola is similar to what was found in another study conducted in Angola [36]. Nevertheless, the prevalence is higher than that which was reported in other SSA countries, such as 11.9% in Nigeria [37], 12.6% in Malawi [38], and 14.79% in Ethiopia [39], but slightly lower (37.9%) than that which was recorded in Angola [7]. The variances in location, study population, and timing could be the likely causes of the findings' discrepancies. Additionally, the differences in findings could be ascribed to the diverse target population and sample size in this study and others, socio-cultural customs, and gender inequality that discourage women from seeking family planning services [40, 41]. It is important to note that the significant unmet need for spacing indicated in Angola may be related to the insufficient supply of contraceptive options, with the private area typically outperforming the public sector. The market's restricted selection of contraceptives seems to hamper women's capacity to choose a method, leading to an unmet demand for spacing [42]. In Zimbabwe, the high prevalence of contraceptive use among women, which resulted from the post-independence Zimbabwean government's encouragement of contraceptive use over the years, could be the cause of the low prevalence of unmet need for spacing in Zimbabwe [43].

The results of this study showed that indicators of women's empowerment, such as autonomy, attitude towards violence, and decision-making, had a substantial impact on the unmet need for spacing. Women with a positive attitude towards violence were less probable than women with a negative attitude to experience an unmet spacing need. Thus, women who had a positive attitude towards violence had decreased probabilities of having their

Table 3 Frequencies and bivariate analysis of variables associated with unmet need for spacing

Variable	Freq (%)	No unmet need % [95%CI]	Unmet need % [95%CI]	p-value
Unmet need for spacing				
no unmet need	137,734(83.4)			
unmet need	27,454(16.6)			
Age				< 0.001
15–19	11,992(7.3)	78.1 [77.1–79.0]	21.9 [21.0–22.9]	
20–24	31,067(18.8)	79 [78.4–79.6]	21 [20.4–21.6]	
25–29	37,783(22.9)	80.4 [79.9–81.0]	19.6 [19.0–20.1]	
30 = 34	33,044(20)	83.2 [82.7–83.7]	16.8 [16.3–17.3]	
35–39	26,944(16.3)	86.8 [86.2–87.3]	13.2 [12.7–13.8]	
40–44	15,981(9.7)	91.6 [91.0–92.1]	8.4 [7.9–9.0]	
45–49	8378(5.1)	94.4 [93.8–95.0]	5.6 [5.0–6.2]	
Total children ever born				< 0.001
No child	10,266(6.2)	88.2 [87.3–88.9]	11.8 [11.1–12.7]	
1–2	54,908(33.2)	81.1 [80.6–81.6]	18.9 [18.4–19.4]	
3–4	48,253(29.2)	82.8 [82.3–83.2]	17.2 [16.8–17.7]	
5 +	51,760(31.3)	85.4 [85.0–85.8]	14.6 [14.2–15.0]	
Wealth index				< 0.001
Poorest	33,001(20)	81.8 [81.2–82.3]	18.2 [17.7–18.8]	
Poorer	33,717(20.4)	82.1 [81.5–82.6]	17.9 [17.4–18.5]	
Middle	32,661(19.8)	82.8 [82.2–83.4]	17.2 [16.6–17.8]	
Richer	32,812(19.9)	84 [83.4–84.6]	16 [15.4–16.6]	
Richest	32,998(20)	86.2 [85.6–86.8]	13.8 [13.2–14.4]	
Religion				< 0.001
Christian	143,143(86.7)	83.7 [83.4–84.0]	16.3 [16.0–16.6]	
Non Christian	21,567(13.1)	81.4 [80.5–82.2]	18.6 [17.8–19.5]	
No religion	479(0.3)	66.1 [59.6–72.1]	33.9 [27.9–40.4]	
Place of residence				0.448
Urban	55,123(33.4)	83.2 [82.6–83.8]	16.8 [16.2–17.4]	
Rural	110,065(66.6)	83.5 [83.1–83.8]	16.5 [16.2–16.9]	
Attitude to violence SWPER score				< 0.001
Low	41,584(25.2)	82.3 [81.7–82.8]	17.7 [17.2–18.3]	
Medium	29,092(17.6)	82.5 [81.9–83.1]	17.5 [16.9–18.1]	
High	94,511(57.2)	84.1 [83.8–84.5]	15.9 [15.5–16.2]	
Autonomy SWPER score				< 0.001
Low	47,027(28.5)	82.4 [81.9–82.9]	17.6 [17.1–18.1]	
Medium	59,088(35.8)	82.2 [81.7–82.6]	17.8 [17.4–18.3]	
High	59,073(35.8)	85.4 [85.0–85.8]	14.6 [14.2–15.0]	
Decision making SWPER score				< 0.001
Low	34,242(20.7)	80 [79.5–80.6]	20 [19.4–20.5]	
Medium	78,113(47.3)	83.2 [82.9–83.6]	16.8 [16.4–17.1]	
High	52,833(32)	85.8 [85.3–86.2]	14.2 [13.8–14.7]	
Total	165,188(100)	83.4 [83.1–83.7]	16.6 [16.3–16.9]	
Sub-region				< 0.001
Southern Africa	4495(2.7)	92.6 [91.0–93.9]	7.4 [6.1–9.0]	
Western Africa	65,090(39.4)	79.8 [79.3–80.3]	20.2 [19.7–20.7]	
Eastern Africa	81,478(49.3)	86.9 [86.5–87.3]	13.1 [12.7–13.5]	
Central Africa	14,125(8.6)	76.5 [75.3–77.6]	23.5 [22.4–24.7]	

Table 4 Multilevel models of independent variables associated with unmet need for spacing

	Model 0	Model 1	Model 2	Model 3	Model 4
SWPER					
Attitude to violence					
Low		1 [1.00,1.00]	1 [1.00,1.00]	1 [1.00,1.00]	1 [1.00,1.00]
Medium		1.03 [0.98,1.09]	1.03 [0.98,1.08]	1.07** [1.02,1.12]	1.06* [1.01,1.11]
High		0.95* [0.91,0.99]	0.97 [0.93,1.01]	0.95* [0.91,0.99]	0.95* [0.91,0.99]
Autonomy					
Low		1 [1.00,1.00]	1 [1.00,1.00]	1 [1.00,1.00]	1 [1.00,1.00]
Medium		1.04* [1.00,1.09]	1.15*** [1.10,1.20]	1.15*** [1.10,1.20]	1.25*** [1.20,1.31]
High		0.86*** [0.82,0.90]	1.18*** [1.12,1.24]	1 [0.95,1.05]	1.32*** [1.25,1.39]
Decision Making					
Low		1 [1.00,1.00]	1 [1.00,1.00]	1 [1.00,1.00]	1 [1.00,1.00]
Medium		0.82*** [0.78,0.85]	0.84*** [0.80,0.88]	0.96 [0.92,1.01]	0.99 [0.94,1.03]
High		0.69*** [0.66,0.73]	0.73*** [0.69,0.77]	0.86*** [0.82,0.91]	0.90*** [0.85,0.95]
Individual level					
Age					
15–19			1 [1.00,1.00]		1 [1.00,1.00]
20–24			0.73*** [0.68,0.78]		0.75*** [0.70,0.80]
25–29			0.56*** [0.52,0.60]		0.57*** [0.53,0.62]
30–34			0.41*** [0.37,0.44]		0.43*** [0.40,0.47]
35–39			0.28*** [0.26,0.31]		0.30*** [0.27,0.33]
40–44			0.16*** [0.14,0.18]		0.18*** [0.16,0.20]
45–49			0.10*** [0.09,0.12]		0.11*** [0.10,0.13]
Total Children ever born					
None			1 [1.00,1.00]		1 [1.00,1.00]
1–2			2.24*** [2.06,2.45]		2.30*** [2.10,2.51]
3–4			2.92*** [2.65,3.20]		2.89*** [2.62,3.18]
5 +			3.74*** [3.37,4.14]		3.52*** [3.17,3.91]
Religion					
Christian			1 [1.00,1.00]		1 [1.00,1.00]
Non-Christian			1.28*** [1.21,1.35]		1.44*** [1.36,1.53]
No religion			2.28*** [1.71,3.05]		1.59**[1.19,2.13]
Contextual factors					
Wealth					
Poorest				1 [1.00,1.00]	1 [1.00,1.00]
Poorer				0.98 [0.93,1.03]	0.98 [0.93,1.04]
Middle				0.93** [0.88,0.98]	0.95 [0.90,1.01]
Richer				0.85*** [0.80,0.90]	0.88*** [0.83,0.94]
Richest				0.73*** [0.68,0.78]	0.80*** [0.74,0.86]
Residence					
Urban				1 [1.00,1.00]	1 [1.00,1.00]
Rural				0.91*** [0.86,0.96]	0.93**[0.88,0.98]
Sub-Region					
Southern Africa				1 [1.00,1.00]	1 [1.00,1.00]
Western Africa				2.85*** [2.29,3.55]	3.44*** [2.73,4.34]
Eastern Africa				1.72*** [1.38,2.14]	2.02*** [1.60,2.55]
Central Africa				3.46*** [2.76,4.33]	4.05*** [3.19,5.13]
N	165,188	165,188	165,188	165,188	165,188
AIC	240,081.16	239,008.98	232,627.54	235,924.73	229,631.04
BIC	240,101.19	239,089.1	232,817.82	236,084.97	229,901.44

Exponentiated coefficients, 95% confidence intervals in brackets, *CI* Confidence Interval, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, 1 [1.00,1.00] = Reference category, *AIC* = Akaike's Information Criterion, *BIC* = Bayesian Information Criterion

demand for spacing unmet. This could suggest that SSA women who are in violent affairs are looking for more contraceptives to space childbearing in order to prevent conception of a child who might be molested by the unstable and unfriendly setting and to safeguard herself against STDs that may be contracted from a risky partner [44, 45]. Women's attitudes towards violence have a substantial impact on how they behave towards their reproductive health [46]. Women who are empowered (with decision-making ability and financial autonomy) are able to select a better health option and to decide whether or not to utilize contraceptives [46]. Therefore, to improve SSA women's reproductive health and guarantee their access to vital family planning services, policymakers in SSA should consider steps to alleviate these gender-based challenges, including intimate partner violence.

Intriguingly, our analysis showed that women with high heights of autonomy were more likely to have needs for spacing unmet. This suggests that independence may not be a risk-reducing factor for the dangers related to unmet family planning needs. This could be as a result of mothers with large families being too busy to seek out reproductive health care, including family planning for spacing [10]. The fact that many families in SSA countries strongly adhere to patriarchal norms means that many women do not have the autonomy to participate significantly in decisions concerning their reproductive health [47]. Typically, men make most choices affecting the welfare of their wives and kids in SSA. According to a study by Nguyen et al. [48], in Vietnam, women's autonomy in terms of reproductive health is dependent on their preferences for contraception. Contraceptive procedures are used regardless of differences in autonomy. Gayatri and Fajarningtiyas [49] stated that women with high levels of autonomy may opt not to take modern contraceptives because of side effects and method-related factors. Studies have also demonstrated how particular cultural norms in several developing countries have an impact on women's autonomy in making decisions regarding their health. This result supports findings from earlier South Asian research that suggest that, in addition to husbands, other family members, like in-laws, may have an impact on reproductive habits [50, 51]. Our findings run counter to Ameyaw and Dickson's [52] contention that women with health autonomy were less probable to suffer unmet demand for spacing than those without it.

The current study revealed that women who had the last say in their reproductive health had a lower probability of having their spacing needs unmet than did women who had little control over their own healthcare. This outcome support a prior study carried out in Ethiopia [53], which discovered that women who made absolute decisions about their reproductive health with specialists had a lower risk of having their spacing needs unmet. It is important to note that various women have different health worries and goals in terms of their reproductive health, so it was preferable for them to make their own contraceptive decisions since doing so would allow them to continue using the method of contraception of their choice [53]. Other studies have indicated that women's participation in family decisions, particularly those that have an impact on their reproductive health, can increase the demand for contraception and decrease unmet needs, notably the unmet need for spacing [54]. The capacity for contraceptive use decision-making requires a significant level of reproductive autonomy and freedom from coercive reproductive practices. Reproductive coercion can involve threats to get pregnant or unwillingness to use or permit the use of contraception. When spouses make the majority of the decisions regarding contraception, the use of contraception is inhibited [51]. This gradually causes the unmet demand for spacing to rise. Contrarily, when women make all of the decisions, they are more probable to use contraceptive services leading to a lower unmet need for spacing [51].

Strengths and limitations

The primary strength of this study is the multi-country analysis it provides based on nationally representative data, which helps policymakers and programme planners in SSA in creating intervention strategies. Once more, the large sample size and the use of well-established processes like the training of seasoned field enumerators and the use of certified instruments in the DHS increase the legitimacy of conclusions from the dataset. Nevertheless, because the surveys used a cross-sectional methodology, it is impossible to determine whether the results are causally related. Additionally, there's a chance that women will give socially acceptable responses and will have a hard time remembering earlier instances of unmet need for spacing. Finally, the differences in survey years can affect how comparable the results are since modernity could affect how prevalent the unmet need for spacing is in recent surveys relative to previous ones.

Conclusions

Unmet need for spacing has been linked to indices of women's empowerment such as attitudes towards violence, independence, and decision-making. Therefore, organizations like UNICEF, UNFPA, and the Bill & Melinda Gates Foundation should consider the SWPER indicators when planning measures in sub-Saharan African countries to tackle the high unmet spacing need among women. Additionally, it is critical that various governments and aid organizations give women's empowerment a high priority as a tactical intervention strategy to increase access to contraception in the sub-Saharan countries under study. These programmes would contribute to reaching SDGs 3.1 and 3.7.

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Author's contributions
SY contributed to the study design and conceptualization. TS, LKD, AFG, BOA and SY drafted the initial draft and performed the analysis. BOA and AS provided technical support and critically reviewed the manuscript for its intellectual content. SY had final responsibility to submit for publication. All authors read and amended drafts of the paper and approved the final version.

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Availability of data and materials
Data for this study were sourced from Demographic and Health surveys (DHS) and available here: http://dhsprogram.com/data/available-datasets.cfm.

Declarations

Ethics approval and consent to participate
Ethics approval was not required for this study since the data is secondary and is available in the public domain. More details regarding DHS data and ethical standards are available at: http://goo.gl/ny8T6X.

Consent for publication
No consent to publish was needed for this study as we did not use any details, images or videos related to individual participants. In addition, data used are available in the public domain.

Competing interests
None.

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References

1. Fatusi AO. Young People's Sexual and Reproductive Health Interventions in Developing Countries: Making the Investments Count. The Journal of adolescent health : official publication of the Society for Adolescent Medicine. 2016;59(3 Suppl):S1–3.
2. United Nations. Take Action for the Sustainable Development Goals 2020 [Available from: https://www.un.org/sustainabledevelopment/sustainable-development-goals/.
3. Starbird E, Norton M, Marcus R. Investing in Family Planning: Key to Achieving the Sustainable Development Goals. Global health, science and practice. 2016;4(2):191–210.
4. Ahmed S, Li Q, Liu L, Tsui AO. Maternal deaths averted by contraceptive use: an analysis of 172 countries. Lancet (London, England). 2012;380(9837):111–25.
5. UNFPA. Investing in three transformative results: realizing powerful returns. New York: United Nations Population Fund (UNFPA); 2022. https://www.unfpa.org/publications/investing-three-transformative-resultsrealizing-powerful-returns.
6. Bishwajit G, Tang S, Yaya S, Feng Z. Unmet need for contraception and its association with unintended pregnancy in Bangladesh. BMC Pregnancy Childbirth. 2017;17(1):186.
7. Yaya S, Ghose B. Prevalence of unmet need for contraception and its association with unwanted pregnancy among married women in Angola. PLoS ONE. 2018;13(12).
8. Fabic MS, Choi Y, Bongaarts J, Darroch JE, Ross JA, Stover J, et al. Meeting demand for family planning within a generation: the post-2015 agenda. Lancet (London, England). 2015;385(9981):1928–31.
9. Haakenstad A, Angelino O, Irvine CMS, Bhutta ZA, Bienhoff K, Bintz C, et al. Measuring contraceptive method mix, prevalence, and demand satisfied by age and marital status in 204 countries and territories, 1970–2019: a systematic analysis for the Global Burden of Disease Study 2019. The Lancet. 2022;400(10348):295–327.
10. Teshale AB. Factors associated with unmet need for family planning in sub-Saharan Africa: A multilevel multinomial logistic regression analysis. PLoS ONE. 2022;17(2): e0263885.
11. Jansen WH 2nd. Existing demand for birth spacing in developing countries: perspectives from household survey data. International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics. 2005;89(Suppl 1):S50–60.
12. Conde-Agudelo A, Belizán JM. Maternal morbidity and mortality associated with interpregnancy interval: cross sectional study. BMJ (Clinical research ed). 2000;321(7271):1255–9.
13. Zhu BP, Rolfs RT, Nangle BE, Horan JM. Effect of the interval between pregnancies on perinatal outcomes. N Engl J Med. 1999;340(8):589–94.
14. Wulifan JK, Jahn A, Hien H, Ilboudo PC, Meda N, Robyn PJ, et al. Determinants of unmet need for family planning in rural Burkina Faso: a multilevel logistic regression analysis. BMC Pregnancy Childbirth. 2017;17(1):426.
15. Nzokirishaka A, Itua I. Determinants of unmet need for family planning among married women of reproductive age in Burundi: a cross-sectional study. Contraception and reproductive medicine. 2018;3:11.
16. Hellwig F, Coll CV, Ewerling F, Barros AJ. Time trends in demand for family planning satisfied: analysis of 73 countries using national health surveys over a 24-year period. J Glob Health. 2019;9(2).
17. Namasivayam A, Osuorah DC, Syed R, Antai D. The role of gender inequities in women's access to reproductive health care: a population-level study of Namibia, Kenya, Nepal, and India. Int J Women's Health. 2012;4:351–64.
18. Azad A D, Charles A G, Ding Q, Trickey A W, Wren S M. The gender gap and healthcare: associations between gender roles and factors affecting healthcare access in Central Malawi, June-August 2017. Arch Public Health. 2020;78(1):119.
19. Morgan R, Tetui M, Muhumuza Kananura R, Ekirapa-Kiracho E, George A S. Gender dynamics affecting maternal health and health care access and use in Uganda. Health Policy Plan. 2017;32(5):v13–21.
20. Ndwiga M, Koome P. Women Empowerment And Unmet Need for Family Planning in Kenya. African Multidisciplinary Journal of Research. 2016;1(2).
21. Utami DA, Samosir OB. Women's empowerment and unmet needs for family planning in Indonesia. IOP Conference Series: Earth and Environmental Science. 2021;716(1).
22. Van Eerdewijk A, Wong F, Vaast C, Newton J, Tyszler M, Pennington A. White paper: A conceptual model on women and girls' empowerment. 2017.
23. Bishop D, Bowman K. Still learning: a critical reflection on three years of measuring women's empowerment in Oxfam. Gend Dev. 2014;22(2):253–69.
24. Jennings L, Na M, Cherewick M, Hindin M, Mullany B, Ahmed S. Women's empowerment and male involvement in antenatal care: analyses of Demographic and Health Surveys (DHS) in selected African countries. BMC Pregnancy Childbirth. 2014;14(1):297.
25. Ahmed S, Creanga AA, Gillespie DG, Tsui AO. Economic status, education and empowerment: implications for maternal health service utilization in developing countries. PLoS ONE. 2010;5(6).
26. Upadhyay UD, Gipson JD, Withers M, Lewis S, Ciaraldi EJ, Fraser A, et al. Women's empowerment and fertility: a review of the literature. Soc Sci Med. 1982;2014(115):111–20.
27. Ewerling F, Lynch JW, Victora CG, van Eerdewijk A, Tyszler M, Barros AJD. The SWPER index for women's empowerment in Africa: development and validation of an index based on survey data. Lancet Glob Health. 2017;5(9):e916–23.
28. Asaolu IO, Okafor CT, Ehiri JC, Dreifuss HM, Ehiri JE. Association between Measures of Women's Empowerment and Use of Modern Contraceptives: An Analysis of Nigeria's Demographic and Health Surveys. Front Public Health. 2016;4:293.

29. Prata N, Fraser A, Huchko MJ, Gipson JD, Withers M, Lewis S, et al. Women's Empowerment and Family Planning: A Review of the Literature. J Biosoc Sci. 2017;49(6):713–43.
30. Hameed W, Azmat SK, Ali M, Sheikh MI, Abbas G, Temmerman M, et al. Women's Empowerment and Contraceptive Use: The Role of Independent versus Couples' Decision-Making, from a Lower Middle Income Country Perspective. PLoS ONE. 2014;9(8).
31. Yaya S, Uthman OA, Ekholuenetale M, Bishwajit G. Women empowerment as an enabling factor of contraceptive use in sub-Saharan Africa: a multilevel analysis of cross-sectional surveys of 32 countries. Reprod Health. 2018;15(1):214.
32. Ewerling F, Raj A, Victora CG, Hellwig F, Coll CV, Barros AJ. SWPER Global: A survey-based women's empowerment index expanded from Africa to all low- and middle-income countries. J Glob Health. 2020;10(2).
33. World Health Organization. Women's empowerment index (SWPER)(DHS re-analyzed by ICEH). Geneva: World Health Organization; 2023.
34. Alie MS, Abebe GF, Negesse Y. Magnitude and determinants of unmet need for family planning among reproductive age women in East Africa: multilevel analysis of recent demographic and health survey data. Contraception and reproductive medicine. 2022;7(1):2.
35. Phiri M, Odimegwu C, Kalinda C. Unmet need for family planning among married women in sub-Saharan Africa: a meta-analysis of DHS data (1995–2020). Contraception and reproductive medicine. 2023;8(1):3.
36. Kabore A, Barro M, Matiaco LM, Kabore I, Pauline Y, Kiemdé C, et al. Factors associated with unmet need for birth spacing among Angolan women. Afr J Reprod Health. 2022;26(6):22–6.
37. Fagbamigbe AF, Afolabi RF, Idemudia ES. Demand and unmet needs of contraception among sexually active in-union women in Nigeria: distribution, associated characteristics, barriers, and program implications. SAGE Open. 2018;8(1):2158244017754023.
38. Nkoka O, Mphande WM, Ntenda PAM, Milanzi EB, Kanje V, Guo SJG. Multilevel analysis of factors associated with unmet need for family planning among Malawian women. BMC Public Health. 2020;20(1):705.
39. Alem AZ, Agegnehu CD. Magnitude and associated factors of unmet need for family planning among rural women in Ethiopia: a multilevel cross-sectional analysis. BMJ Open. 2021;11(4):e044060. https://doi.org/10.1136/bmjopen-2020-044060.
40. Pham BN, Whittaker M, Okely AD, Pomat W. Measuring unmet need for contraception among women in rural areas of Papua New Guinea. Sexual and reproductive health matters. 2020;28(2):1848004.
41. Agyekum AK, Adde KS, Aboagye RG, Salihu T, Seidu AA, Ahinkorah BO. Unmet need for contraception and its associated factors among women in Papua New Guinea: analysis from the demographic and health survey. Reprod Health. 2022;19(1):113.
42. Nieto-Andrade B, Fidel E, Simmons R, Sievers D, Fedorova A, Bell S, et al. Women's Limited Choice and Availability of Modern Contraception at Retail Outlets and Public-Sector Facilities in Luanda, Angola, 2012–2015. Global health, science and practice. 2017;5(1):75–89.
43. Ahinkorah BO, Budu E, Aboagye RG, Agbaglo E, Arthur-Holmes F, Adu C, et al. Factors associated with modern contraceptive use among women with no fertility intention in sub-Saharan Africa: evidence from cross-sectional surveys of 29 countries. Contraception and reproductive medicine. 2021;6(1):22.
44. Okenwa L, Lawoko S, Jansson B. Contraception, reproductive health and pregnancy outcomes among women exposed to intimate partner violence in Nigeria. The European journal of contraception & reproductive health care : the official journal of the European Society of Contraception. 2011;16(1):18–25.
45. Dadras O, Nakayama T, Kihara M, Ono-Kihara M, Dadras F. Intimate partner violence and unmet need for family planning in Afghan women: the implication for policy and practice. Reprod Health. 2022;19(1):52.
46. Khan MN, Islam MM. Women's attitude towards wife-beating and its relationship with reproductive healthcare seeking behavior: A country-wide population survey in Bangladesh. PLoS One. 2018;13(6):e0198833. https://doi.org/10.1371/journal.pone.0198833.
47. Fawole OI, Adeoye IA. Women's status within the household as a determinant of maternal health care use in Nigeria. Afr Health Sci. 2015;15(1):217–25.
48. Nguyen N, Londeree J, Nguyen LH, Tran DH, Gallo MF. Reproductive autonomy and contraceptive use among women in Hanoi, Vietnam. Contracept X. 2019;1:100011. https://doi.org/10.1016/j.conx.2019.100011.
49. Gayatri M, Fajarningtiyas DN. Unmet Need for Contraception Among Young Women: Evidence From Indonesia. Journal of Population Social Studies. 2023;31:170–85.
50. Sathar ZA, Kazi S. Women's autonomy in the context of rural Pakistan. The Pakistan Development Review. 2000:89–110.
51. MacQuarrie KLD, Aziz A. Women's decision-making and contraceptive use in Pakistan: an analysis of Demographic and Health Survey data. Sexual and reproductive health matters. 2021;29(2):2020953.
52. Ameyaw EK, Dickson KS. Skilled birth attendance in Sierra Leone, Niger, and Mali: analysis of demographic and health surveys. BMC Public Health. 2020;20(1):164.
53. Tadele A, Getinet M. Determinants of Postnatal Care Check-ups in Ethiopia: A Multi-Level Analysis. Ethiop J Health Sci. 2021;31(4):753–60. https://doi.org/10.4314/ejhs.v31i4.9.
54. Austin A. Unmet contraceptive need among married Nigerian women: an examination of trends and drivers. Contraception. 2015;91(1):31–8.

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